# ASSIGNMENT 5

Textbook Assignment: "Heating Systems," chapter 4, pages 4-36 through 4-51.

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5-1. Before trying to start or service oil burners, you should take what action?

1. Obtain a pressure gauge
2. Locate a full set of Allen setscrew wrenches
3. Order a complete set of socket wrenches
4. Ensure the correct maintenance equipment is available

5-2. When performing oil burner maintenance, you should use what type of pipe dope?

1. Oil line
2. Graphite
3. Graphite cord
4. SAE 10

5-3. Which of the following materials should you use to clean the grease and gum out of an oil burner nozzle?

1. Diesel
2. Gasoline
3. Kerosene
4. Warm soapy water

5-4. When installing an oil burner nozzle after cleaning, you should set the electrodes

1. 5/8 inch apart, 1/8 inch ahead of the nozzle, and 1/2 inch above the nozzle center line
2. 1/2 inch apart, 1/4 inch ahead of the nozzle, and 5/8 inch above the nozzle center line
3. 1/8 inch apart, 5/8 inch ahead of the nozzle, and 3/8 inch above the nozzle center line
4. According to the specific settings in the manufacturer's manual

5-5. After reinstalling an oil burner pump, you should take what action when there is evidence of end pressure?

1. Loosen the coupling and move it away from the pump
2. Loosen the coupling and move it closer to the pump
3. Loosen the pump and move it closer to the coupling
4. Loosen the pump and move it away from the coupling

5-6. After visually adjusting the burner, you should allow it to run for what length of time?

1. 10 minutes
2. 20 minutes
3. 30 minutes
4. 40 minutes

5-7. Which of the following faults is NOT likely to be caused by too little draft in an oil burner?

1. Firebox pressure
2. Odors in the building
3. Smoke
4. Flame flare-up

5-8. When the burner and draft are adjusted correctly, a flue-gas analysis should indicate what percentage of $CO^2$?

1. 10 percent
2. 15 percent
3. 20 percent
4. 30 percent

5-9. When the furnace is large enough and the burner is set for correct oil flow with minimum amount of air, what should be the maximum stack temperature?

1. 500°F
2. 600°F
3. 700°F
4. 800°F

5-10. What type of gauge measures suction in the smoke pipe of an oil burner?

1. Suction
2. Draft
3. Vacuum
4. Barometric

5-11. Suction in the smoke pipe or combustion chamber of an oil burner is measured in

1. inches of mercury
2. centimeters of mercury
3. inches of water
4. cubic centimeters of water

5-12. What device should you use to determine the percentage of $CO_2$ produced by combustion?

1. Flue-gas analyzer
2. Draft analyzer
3. Stack analyzer
4. Gas-burner analyzer

5-13. To test fuel pump valve operation, remove the nozzle line at the pump connection, start and stop the pump, and observe whether the valve cuts off sharp and clean.

1. True
2. False

5-14. When the pressure regulator of the fuel pump requires adjustment, you should use which of the following tools?

1. Phillips head screwdriver
2. Allen wrench
3. Inch-pound torque wrench
4. Tack hammer

5-15. Refer to appendix II, table M. When you troubleshoot an oil pump, what is the most likely cause of noisy operation?

1. Restricted intake line
2. Broken coupling
3. Air in the inlet pipe
4. Loose plugs or fittings

5-16. A cast-iron hot-water boiler is capable of developing what maximum horsepower?

1. 30
2. 55
3. 80
4. 98

5-17. What term is used to identify a boiler that has water in its base?

1. Wet-bottom
2. Water-laden
3. Wet-boiler
4. Soaked-boiler

5-18. What is the primary disadvantage of cast-iron hot-water heating boilers?

1. They are subject to corrosion
2. They are constructed in two sections
3. They crack or break when handled improperly
4. They require special equipment to lift them

5-19. Most steel hot-water boilers are constructed in a total of how many sections?

1. One
2. Two
3. Three
4. Four

5-20. The major disadvantage of a one-piece steel hot-water boiler is that it is heavy and requires special lifting equipment.

1. True
2. False

5-21. A boiler foundation should extend what distance above the finished floor?

1. 5 inches
2. 2 inches
3. 3 inches
4. 4 inches

5-22. What design feature in a boiler holds the hot gases as long as possible so they give maximum heat before passing into the chimney?

1. Baffles
2. Accumulators
3. Retainers
4. Reservoirs

5-23. As a minimum, pressure-relief valves should be operated at what intervals to prevent corrosion or sticking?

1. Weekly
2. Biweekly
3. Monthly
4. Bimonthly

5-24. What action should you take when the relief pressure on the gauge exceeds the setting of the nressure-relief valve?

1. Check the valve pressure with a spring scale and adjust it to the required amount
2. Check the valve pressure with an accurate gauge and replace the defective pressure gauge
3. Check the valve pressure with an accurate gauge and adjust it to the required amount
4. Replace the valve

5-25. To calibrate a pressure gauge correctly, you should use a

1. spring scale
2. deadweight tester
3. screed unit
4. master stage gauge

5-26. What device shuts down the firing equipment in case of an induced or forced draft failure?

1. Pressure gauge
2. Pressure-relief valve
3. Water-level control valve
4. Airflow switch

5-27. The distribution systems and piping for hot-water heating systems are simpler in design than those for steam.

1. True
2. False

5-28. The use of a one-pipe, open-tank gravity system is NOT recommended for which of the following reasons?

1. It is too expensive
2. It is difficult
3. It is hard to get enough circulation by gravity
4. It requires too much maintenance

5-29. The water temperatures are lowest in the two-pipe, open-tank gravity system in what part of the circuit?

1. Top
2. Bottom
3. Beginning
4. End

5-30. When the water in a one-pipe, closed tank distribution system is heated, the water expands into the pneumatic expansion tank.

1. True
2. False

5-31. A gravity closed-tank system with an average boiler water temperature of 190°F has a radiator emission rate of

1. 180 Btu per square foot
2. 170 Btu per square foot
3. 160 Btu per square foot
4. 150 Btu per square foot

5-32. What factor allows the temperature in a closed hot-water system to exceed 212°F?

1. Increased pressure prevents the water from boiling
2. Decreased pressure prevents the water from boiling
3. Steam is required for maximum heating
4. Average radiator output exceeds 150 Btu psf

5-33. In a hot-water system, the water being distributed is within what temperature range?

1. 130°F to 220°F
2. 140°F to 212°F
3. 150°F to 250°F
4. 160°F to 270°F

5-34. Of the following advantages, which one does NOT apply to a forced-circulation, hot-water distribution svstem?

1. Smaller diameter pipe can be used
2. Radiators can be placed in the same level as the boiler
3. A positive flow of water is assured throughout the system
4. The friction and temperature losses for all radiators are nearly equal

5-35. What component is used on a one-pipe, closed-tank, forced-circulation system that is not required on a one-pipe, gravity system?

1. Pressure-relief valve
2. Circulating pump
3. Water-level control
4. Airflow switch

5-36. What is the minimum pitch per 10 feet for main and branches, so air in the system may be discharged through radiators and relief valves?

1. 1 inch
2. 1 1/2 inches
3. 2 inches
4. 2 1/2 inches

5-37. Which of the following components allows trapped air in the distribution lines of a hot-water distribution system to be released from the system?

1. Air shutoff vent
2. Air pressure release valve
3. Manually operated key type of air vent
4. Quick-release valve

5-38. You should take what action to prevent water from leaking around the valve stem of a radiator shutoff valve?

1. Replace the packing
2. Tighten the packing nut
3. Install a valve stem
4. Install a new shutoff valve

5-39. You should inspect unit heaters at what intervals?

1. Weekly
2. Monthly
3. Quarterly
4. Yearly

5-40. A circulating pump does not require which of the following devices?

1. Shaft packing glands and valves
2. Valves and float elements
3. Shaft packing glands and seals
4. Float control elements and traps

5-41. What is the purpose of the reducing valve?

1. To keep the closed system supplied with water at a predetermined pressure
2. To keep the open system supplied with water at a predetermined pressure
3. To reduce differences in water pressure to a safe system pressure
4. To maintain differences in water temperature and safe system pressure

5-42. You should check the flow control valve for correct down-free movement at what intervals?

1. Monthly
2. Biweekly
3. Weekly
4. Daily

5-43. Which of the following is not a maintenance action required on a hot-water heating system?

1. Ensure that all of the air is out of the system
2. Ensure that the radiators are full of water
3. Ensure that the circulating pumps are oiled regularly
4. Ensure that the pressure-reducing valves are checked periodically

5-44. Operator maintenance on an electrically driven feed pump consists mostly of

1. oiling the pump and motor
2. repacking the stuffing box
3. cleaning the pump and motor
4. tightening the packing gland nuts

5-45. Which of the following actions is not a maintenance requirement for feed-water heaters and economizers?

1. Removing solid matter from the units
2. Lubricating the pump motor
3. Repairing inoperative valve and pumps
4. Stopping steam and water leaks

5-46. Which of the following is not an advantage of a high-temperature hot-water (HTHW) system?

1. Minimum maintenance
2. High thermal efficiency
3. Easy operation
4. Light weight design

5-47. What happens to the heat in a high-temperature hot-water system that is NOT used by heat-consuming equipment or lost through pipe radiation?

1. It is vented to the atmosphere
2. It is returned to the boiler plant
3. It is stored in a reservoir
4. It is recirculated through the system

5-48. What is the high-temperature range for most military and federal heating plants?

1. 300°F to 400°F
2. 325°F to 425°F
3. 350°F to 450°F
4. 375°F to 475°F

5-49. What factor determines the maximum water temperature used in a high-temperature hot-water system?

1. Thermal efficiency
2. Cost
3. Method of circulating the water
4. Operating pressure

5-50. What type of pump is used in a one pump high-temperature hot-water circulation system?

1. Rotary
2. Diaphragm
3. Reciprocal
4. Centrifugal

5-51. The two common ways of heating water in an HTHW system are to use hot-water boilers and a/an

1. cascade or direct contact heater
2. matched set of generators
3. indirect contact heater
4. drum installation

5-52. What are the basic designs for pressurizing HTHW systems?

1. Mechanical gas cushion and automatic gas cushion
2. Saturated steam cushion and mechanical gas cushion
3. Automatic gas cushion and hydraulic gas cushion
4. Automatic gas cushion and saturated gas cushion

5-53. The water in a HTHW heating system is drawn from the lower part of the expansion tank, mixed with the system return water, and circulated through the system. Mixing is required for which of the following reasons?

1. To prevent cavitation at the pump suction
2. To prevent cavitation at the pump discharge
3. To decrease saturation temperature in the system flashing at the pump discharge
4. To maintain saturation temperature in the system

5-54. Load variations in a HTHW system will cause supply pressure changes, create flashing of saturated liquid in the system, and produce

1. cavitation
2. corrosion
3. water hammer
4. air locks

5-55. What type of gas is used as the source of pressure in a mechanical gas cushion?

1. Oxygen
2. Nitrogen
3. Methane
4. Carbon dioxide

5-56. What is the weakest link in a mechanical gas cushion?

1. Reservoir for stagnant water
2. Nitrogen space in the expansion tank
3. Generator tubes
4. Steam drum

5-57. To prevent oxygen corrosion in a HTHW system, you should add what chemical to the system?

1. Aluminum sulfite
2. Sodium phosphate
3. Soda ash
4. Sodium sulfite

5-58. To rid the system of oxygen, you should allow the expansion drum vent in a steam-pressurized system to blow for what length of time?

1. 1 hour
2. 2 hours
3. 3 hours
4. 4 hours

5-59. When operating an HTHW system, you should ensure the water is within what pH range?

1. 6.3 to 6.9
2. 7.3 to 7.9
3. 8.3 to 8.9
4. 9.3 to 9.9

5-60. After installing an HTHW system, you should test the system at 450 psi for what minimum amount of time?

1. 4 hours
2. 8 hours
3. 12 hours
4. 24 hours

5-61. The generator tubes of an HTHW system are subjected to an ASME test of 900 psi.

1. True
2. False

5-62. All valves and accessories in a HTHW system are rated at working pressures of 540 to 1,075 psi at

1. 475°F
2. 450°F
3. 425°F
4. 400°F